Make it Drain!
Municipal Inspection and Maintenance for Stormwater Best Management Practices

Presented By
Rick Celender, Mike Singleton, and Bill Trimbath
Civil & Environmental Consultants, Inc.
MS4 Program Overview

Prepared For

Presented By

Bill Trimbath
Civil & Environmental Consultants, Inc.
Presentation Outline

► Definition
► Minimum Control Measures
► Benefits of the MS4 Program
► How to Finance the Program
Jurisdiction

In 1990 EPA established the National Pollutant Discharge Elimination System (NPDES) Stormwater Program

- Required operators of medium to large MS4 systems to implement control programs
- Extended coverage to certain “small” MS4s
**EPA’s Stormwater Phase II rule**

- Establishes the MS4 stormwater management program

- It’s intent is to, “...improve the nation’s waterways by reducing the quantity of pollutants that stormwater carries into storm sewers.”

- Focus is on improving water quality
Common Pollutants

► Oil and grease from paved areas
► Pesticides from lawns
► Sediment from construction sites
► Discarded trash
► Cigarette butts, wrappers, plastic bottles
What is required of a MCM Plan?

► Minimum control measures
► Multiple Best Management Practices (BMPs) that must be implemented.
Conveyance Systems Subject to MS4

- Collecting and/or conveying stormwater
- Owned by a public entity
- Not used as a combined sewer
- Not part of a publicly owned treatment plant
What is a small, medium or large MS4?

- **Small**—Any MS4 not covered by the Phase I stormwater program (Smaller than 100,000 population)

- **Medium**—Population between 100,000 and 249,999

- **Large** Population larger than 250,000
Definition of small MS4

- Systems with less than 10,000 population in a rural area
- Systems with less than 1000 pop/ square mile in a rural area
- Systems located outside and urban area
Stormwater Permit Program

► Federal Regulation Program requires a permit
► PADEP created permitting program to meet federal regulations
What do permits require?

► Implement a stormwater management program
► Track progress toward goals
► Report on progress
Six Minimum Measures

1. Public education and outreach
2. Public participation and involvement
3. Illicit discharge detection and elimination
4. Construction Site Runoff Control
5. Post Construction runoff control
6. Pollution Prevention/Good Housekeeping
MCM No 1 Public Education and Outreach

► Develop and maintain an outreach program
► Identify list of audiences
► Distribute education materials
MCM No 2  Public Involvement / Participation

► Develop and maintain an outreach program
► Provide opportunity for public notice and feedback
► Solicit involvement form target audience groups
► Start a volunteer program
MCM No 3  Illicit Discharge Detection and Elimination

► Develop written program (Ordinance)
► Develop and maintain a map of regulated outfalls
► Develop map of conveyance system
► Educate the community
What is an “illicit” Discharge?

- Sanitary wastewater
- Effluent from septic tanks
- Car wash wastewaters
- Improper oil and grease disposal
- Radiator flushing liquids
- Laundry wastewaters
- Spills from roadway accidents
- Improper disposal of auto and household toxics
MCM No 4  Construction Site Stormwater Control

► Develop a program containing compliance procedures
► Erosion and sedimentation control BMPs
► Construction site control
► Record tracking system
► Coordination with county conservation district
MCM No 5 Post Construction Stormwater Management (PCSM)

► Develop written program
► Develop tracking system
► Implement controls
► Enforce ordinances
► Encourage low impact development
MCM No 6 Pollution Prevention /Good Housekeeping

- List of operations
- Implement O & M Program
- Vehicle maintenance, fueling and washing
- Training community employees
Required documentation

► Report must be submitted during the first permit term
► Reports submitted in years 2 and 4 following the first year
Report Must Contain

► Status of compliance with permit conditions.
► Assessment of the appropriateness of selected BMPs
► Progress toward reachable goals
► Summary of stormwater activities planned for the next reporting cycle
► Change in any best management practice
Benefits of the MS4 Program

► Enhanced water quality
► Enhanced aesthetic values
► Enhanced recreational opportunities for fishing and swimming
► Drinking water benefits
How to Finance?

► Stormwater authority
► Monthly stormwater charges
► Range from $2 / to $12 / month per household
Waters of the United States

- MS4 systems not included in the new definition
- Inclusion would have subject MS4 systems to additional permit requirements
Questions?
Typical BMP Design & Function Overview

Presented By

Rick Celender
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This manual is based on the following set of principles:

1. Managing stormwater as a resource;
2. Preserving and utilizing existing natural features and systems;
3. Managing stormwater as close to the source as possible;
4. Sustaining the hydrologic balance of surface and ground water;
5. Disconnecting, decentralizing and distributing sources and discharges;
6. Slowing runoff down, and not speeding it up;
7. Preventing potential water quality and quantity problems;
8. Minimizing problems that cannot be avoided;
9. Integrating stormwater management into the initial site design process; and
10. Inspecting and maintaining all BMPs.
Managing Stormwater as a resource; Sustaining the hydrologic balance of surface water and groundwater.

- Stormwater is a critical resource. We depend on stormwater to replenish groundwater for drinking water and for the health of many aquatic systems. Each is dependent on the steady discharge of stormwater and groundwater.

- The replenishment, or recharge, of groundwater depends on the infiltration of stormwater into the ground.

- Stormwater may carry a variety of pollutants into our waters including metals, bacteria, oil and grease, pesticides, nutrients and sediment.
Preventing potential water quality and quantity problems; Minimizing problems that can be avoided.

► Increased frequency and magnitude of downstream flooding due to rapid runoff of stormwater;

► Enlarged stream channels, increased channel scouring and stream bank slumping, and resulting increased sediment loads due to increased frequency and magnitude of high flows;

► Reduction in the quality of aquatic habitat due to pollutant and heat loading, reduced base flows, enlarged channels, and smothering with sediment.
Routine maintenance and non-routine repair of stormwater BMPs should be done according to a schedule or as soon as a problem is discovered. Many BMPs are rendered ineffective for runoff control if not maintained properly, it is essential that maintenance schedules are maintained and repairs made promptly.

Documentation should be kept of the dates of inspection, findings, and maintenance and repairs that result from the findings of the inspector.

Inspecting and maintaining all BMP’s.

Massive sinkhole in Rochester ordered filled by the State Department of Environmental Protection to have the hole filled by the end of the month.
Dry Extended Detention Basin

- Dry extended detention basins are surface stormwater structures which provide for the temporary storage of stormwater runoff to prevent downstream flooding impacts.
- Water quality benefits may be achieved with extended detention of the runoff volume from the water quality design storm.
Maintenance is necessary to ensure proper functionality of the extended detention basin and should take place on a quarterly basis.

A basin maintenance plan should be developed which includes the following measures:

► All basin structures expected to receive and/or trap debris and sediment should be inspected for clogging and excessive debris and sediment accumulation at least four times per year, as well as after every storm greater than 1 inch.

► Structures include basin bottoms, trash racks, outlets, structures, riprap or gabion structures, and inlets.

► Sediment removal should be conducted when the basin is completely dry. Sediment should be disposed of properly and disturbed areas need to be immediately stabilized and revegetated.

► Mowing and/or trimming of vegetation should be performed as necessary to sustain the system. All waste/debris should be removed from the basin.

► Vegetated areas should be inspected annually for erosion.

► Vegetated areas should be inspected annually for unwanted growth of exotic/invasive species.

► Vegetative cover should be maintained at a minimum of 95 percent.
Wet Detention Ponds

- Wet Detention Ponds are stormwater basins that include a permanent pool for water quality treatment and additional capacity above the permanent pool for temporary storage.
- Wet Ponds provide for temporary storage of stormwater runoff to prevent downstream flooding impacts.

Wet pond with vegetated edge
Photo courtesy of Westmoreland Conservation District

Detail From PADEP BMP Manual
Wet Pond – Maintenance

Wet Ponds should have a maintenance plan and privately owned facilities should have an easement, deed restriction, or other legal measure to prevent neglect or removal.

A Pond maintenance plan should be developed which includes the following measures:

► During the first growing season or until established, vegetation should be inspected every 2 to 3 weeks. WPs should be inspected at least 4 times per year and after major storms (greater than 2 inches in 24 hours) or rapid ice breakup.

► Inspections should access the vegetation, erosion, flow channelization, bank stability, inlet/outlet conditions, embankment, and sediment/debris accumulation. The pond drain should also be inspected and tested 4 times per year. Problems should be corrected as soon as possible.

► Undesirable species should be carefully removed and desirable replacements planted if necessary.
Vegetation should maintain at least an 85 percent cover of the emergent vegetation zone and buffer area.

Annual harvesting of vegetation may increase the nutrient removal of WPs; if performed it should generally be done in the summer so that there is adequate regrowth before winter.

Care should be taken to minimize disturbance, especially of bottom sediments, during harvesting. The potential disturbance from harvesting may outweigh its benefits unless the WP receives a particularly high nutrient load or discharges to a nutrient-sensitive waterbody.

Sediment should be removed from the forebay before it occupies 50 percent of the forebay, typically every 5 to 10 years.
Outlet Structures

Angle iron and rebar trash rack
Photo courtesy of Westmoreland Conservation District

Painted rebar trash rack
Photo courtesy of Westmoreland Conservation District

StormRax

TRASH RACK FOR TYPE M INLET BASIN RISER
Line drawing provided by Westmoreland Conservation District
Underground detention systems are designed to manage excess stormwater runoff and provide limited water quality benefits.
# Underground Detention Systems Maintenance

<table>
<thead>
<tr>
<th>Inspection Activities</th>
<th>Suggested Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>• After several storm events or an extreme storm event, inspect for: signs of clogging of the inlet or outlet structure.</td>
<td>As Needed</td>
</tr>
<tr>
<td>• Inspect for: travel in the drainage system, erosion; sediment in the structure, embankment; hazards to worker’s health or safety; and signs of mechanical vibration, cracking; leaks.</td>
<td>Semi-annually</td>
</tr>
<tr>
<td>• Inspect that the system is functioning properly and is aesthetically pleasing and are operating as intended.</td>
<td>Annually</td>
</tr>
<tr>
<td>• Note signs of sediment accumulations and remove sediment when the pond volume has become significantly reduced.</td>
<td></td>
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<th>Maintenance Activities</th>
<th>Suggested Schedule</th>
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</thead>
<tbody>
<tr>
<td>• Perform structural maintenance. Ensure that all components are in good condition and are operating properly.</td>
<td>Monthly or as needed</td>
</tr>
<tr>
<td>• Clean and remove sediment from the system.</td>
<td>As Needed</td>
</tr>
<tr>
<td>• Repair damaged structures and repair undercut or eroded areas.</td>
<td>As Needed</td>
</tr>
<tr>
<td>• Monitor sediment accumulations, and remove sediment when the pond volume has become significantly reduced.</td>
<td>As Needed</td>
</tr>
</tbody>
</table>
Rain Gardens

Rain Gardens (Bioretention) is a method of treating stormwater by pooling water on the surface and allowing filtering and settling of suspended solids and sediment at the mulch layer, prior to entering the plant/soil/microbe complex media for infiltration and pollutant removal.
Properly designed and installed Rain Garden areas require some regular maintenance. While vegetation is being established, pruning and weeding may be required. A maintenance plan should be developed which includes the following measures:

► Trash & debris may also need to be removed every year. Perennial plantings may be cut down at the end of the growing season.

► Mulch should be re-spread when erosion is evident and be replenished as needed. Once every 2 to 3 years the entire area may require mulch replacement.

► Bioretention areas should be inspected at least two times per year for sediment buildup, erosion, vegetative conditions, etc.

► During periods of extended drought, Bioretention areas may require watering.

► Trees and shrubs should be inspected twice per year to evaluate health.

Rain Garden – Maintenance

Mount Pleasant Borough Parking Lot

Two rain gardens in November, at the end of their first growing season.

Two years after installation and numerous rain events, the parking lot rain gardens successfully capture and treat runoff from each storm.
Fabco StormBasin Maintenance:

After installation the StormBasin requires periodic cleaning. There are no hard and fast rules in this regard. Small units and installation sites with higher than expected sediment loads or areas with significant trees and foliage require more maintenance. In general, Fabco Industries recommends cleaning out the unit(s) twice per year by removing the debris, sand and silt and replacement of the cartridges once per year. An Operations and Maintenance Manual is provided as Attachment E.
Water Quality Units (StormCeptor, etc.)

The system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. Follow manufacturers recommendations.
Outlet Protection

GOOD

YIKES!

CPESC, Inc.
Stabilization

The construction site should be stabilized as soon as possible after completion.

Establishment of final cover must be initiated no later than 7 days after reaching final grade.

Final stabilization means that all soil-disturbing activities are completed, and that either a permanent vegetative cover with a density of 70% or greater has been established or that the surface has been stabilized by hard cover such as pavement or buildings.
Stabilization

70% requirement of *total area vegetated* looks like this...
Housekeeping Issues – Vehicle Maintenance Areas
Housekeeping Issues

Waste

Managemen

Fuel

Management

Secondary

Containment
Housekeeping Issues - Signage

**FUEL SPILL RESPONSE PROCEDURE**

*IN CASE OF FIRE OR EXPLOSION*
*EVACUATE IMMEDIATELY AND CALL 911 FROM A SAFE LOCATION*

**IF IT IS SAFE TO DO SO:**
*STOP THE SPILL, USE EMERGENCY SHUT-OFF LOCATED ON BUILDING*
*USE MATERIALS FROM THE SPILL KIT TO: (LOCATED BY THE STORAGE SHED)*
  • CONTAIN THE SPILL
  • PROTECT THE CATCH BASIN
  • ABSORB THE SPILL

**CALL ENVIRONMENTAL HEALTH AND SAFETY 726-7273**
**NOTIFY YOUR SUPERVISOR**

*IF YOU HAVE ANY QUESTIONS ABOUT PROPER SPILL PROCEDURES CONTACT ENVIRONMENTAL HEALTH AND SAFETY (726-7273) OR YOUR SUPERVISOR PRIOR TO USING THIS FACILITY.*
Questions?
Inspection, Maintenance and Repair

Prepared For

Presented By

Mike Singleton
Civil & Environmental Consultants, Inc.
CEC

► CEC-SIMS
  ▪ Site Infrastructure Management Services

► CEC-CM
  ▪ Construction Management

► Programs are best friends – different but usually together

► This presentation is SIMS
  ▪ Inspections
  ▪ Evaluations
  ▪ Maintenance / repairs
Why maintain?

► Proper function
► Regulatory requirements
► Minimize catastrophic results
► Save cost over time
► Minimize public complaints
► Identify what works and what doesn’t
► Help with public safety
► Aesthetics
So you know the rules, you’ve approved the BMP’s......now what?

► Make a plan - Database

► Set up a program

► Educate

► Update the database

► Put it on a schedule

► Assign cost information

► Prioritize

► Attack
Make a Plan

► Catalog all the facilities. GIS.

► Ponds, developments, roads, storm sewers, infiltration basins, etc.
  ▪ Identify major components of systems
  ▪ Separate by pond, road, storm run, etc.

► Be as detailed or as vague as fits your municipality or as you see fit.
  ▪ Small municipality – divide into subdivisions
  ▪ Large municipality – divide the subdivisions into streets
  ▪ Very large – divide the streets into drainage areas
  ▪ Commercial property
Part of the plan is to further detail the items in the areas of concern

► Ponds
  ▪ Pipes, structures, spillways, outfalls
► Storm sewers
  ▪ Pipe, inlets, manholes, endwalls, aprons, cleanouts
► Roads
  ▪ Pavement, underdrains, holes / settlement, cracks, dirt / debris
► Curbs (they are part of the system)
► Slopes
  ▪ Vegetation, slips / slides, erosion
► E/S Measures (yes, it matters)
► Infiltration Basins
  ▪ Vegetation, soil cover, draining?
Set-up a Program

► Inspect
  ▪ Get out and walk
  ▪ CCTV
  ▪ Observe

► Clean
  ▪ Sediment
  ▪ Debris

► Refresh
  ▪ Rip-Rap aprons
  ▪ Sealants
  ▪ Vegetation

Figure 3.4: Levels of Maintenance for Stormwater Treatment Practices.

Civil & Environmental Consultants, Inc.
Set-up a Program

► Fix / Repair
  ▪ Fix
  ▪ Surface
  ▪ Stabilize

► Maintain
  ▪ Annually
  ▪ Fix things as you go

► Document!!!!
Inspections

► Perform inspections of each facility.
► Complete a form
► Prepare a sketch
► Take photos
Inspections

The focus is on problems and issues.

We do this to prevent future problems and issues.

By doing quarterly inspections, problems can be identified and addressed before they become bigger problems.

Can’t be a drive-by.
Do you know or are you guessing?
First time is the worst time
It gets better IF you keep up
Educate

► Know what to look for
► Know what is OK, what is not
► Be able to identify a maintenance issue
► Be able to identify a failure
► Be able to foresee a failure
  ▪ Maintenance issues become failures
► Understand the source of the problem
► Understand what is an emergency vs. routine maintenance
Failures lead to......Failures!
Update the database

► Things change. Keep your plan current.

► During the site reconnaissance you may identify new items or areas that need attention.

► Items that are repaired may need to be re-visited.

► Fine tune the database to provide finer detail.

► Identify the good as well as the bad. Let’s you know what is changing.
Put it on a schedule.

► It needs to be something you do.

► Pick a day in the month. Set it in stone.

► Allows for date driven evaluation. “It was looking good last month.”

► Keeps things in regulatory perspective.

► It makes it important.

► It allows for budgeting.
Assign cost information

► Allows for budgeting.

► Eludes to degree of repair / maintenance.

► Use as a barometer of bid work.

► Use as a barometer of progress being made.
  ▪ Costs should decrease over time for the same scope of work.
Prioritize

- Prioritize based on severity of problem.
- Prioritize based on cost.
- Allows for a plan and a schedule.
- Allows for proper documentation and future priorities.
Attack

Do the work.
What is a storm water system?

A storm system is anything that conveys, stores, or discharges storm water, including:

- Pipes
- Manholes
- Inlets
- Aprons
- Endwalls
- Cleanouts
- Ponds
- Channels / Swales
- Roadways
- Curbs
- Dirt
- Erosion Control Items

All of these items need to be monitored and maintained.
Pipes

► Sliding areas

► No discharge

► Ponding water at entrance

► Sink holes / observed settlement

► Visual inspection

► Really green areas
Pipes
Manholes / Inlets

- Sliding areas
- Settlement around perimeter
- Tilting
- Visual inspection---debris
- Ponding water----back-up indicator
- Off-setting / damaged risers
Manholes / Inlets
Endwalls and Aprons

- Sliding areas
- Ponding water
- Eroded outlet areas
- Sediment Accumulations
- Broken
- Clogged – debris
- Undermining
Endwalls / Aprons
Ponds

- Slides / erosions
- Vegetation
- Outlet Structures
- Spillways
- Sediment accumulations
- Debris
Ponds
Channels / Swales

► Debris

► Negative slopes / ponding water

► Vegetation – too much or none at all

► Erosion
Roads and Curbs

► Cracking

► Settling

► Ponding water

► Missing or damaged curbs
Roads and Curbs

- Clean sediment and debris.

- Roads have oils, grease, salts, etc.
Underground Storage Tanks

► Can’t see them from the surface.
  ▪ **** Confined Space Work

► Damage, separated joints, failing pipe.

► Sediment, debris.

Interesting project!!!
• Sediment- lots
• Holes- 76,000
• Orifice Plate- no outlet
• Fill slope- YEP!
• Underdrain- No help
Gravity works
E/S----Storm water facilities closest cousin
Summary

► By not maintaining infrastructure not only doesn’t work, but it also can cause damage to other infrastructure

► Things stop working as designed

► Can be an invitation to unwelcome guests (wetlands)

► Storm water maintenance and E/S control are closely related

► Causes flooding

► Landslides

► Nuisances

► Mosquito homes

► Pavement damage such as heaving, potholes, etc.

► Subsurface water in places you don’t want it, but can’t see

► Pollution – regulatory consequences

► Sink holes / settlement
Questions?
New Ideas & Technologies

Prepared For

Presented By

Rick Celender
Civil & Environmental Consultants, Inc.
Alternate Drainage Controls

► Physical Conditions at Site
  ▪ What is the Issues?
    o Unsuitable soils
    o Stockpiling
    o Sediment Laden Runoff
    o Dewatering
    o Slides
    o Groundwater

► Explore Alternate Controls
The RIBS Bags and RIBSCage units can be transported with a standard pickup truck, so they require no heavy machinery for setup.

Pre-packed Emergency Kits are available in 3’, 4’, and 6’ heights.

Emergency Kits come pre-packed with assembly/use instructions, two (2) RIBSCage units, and 500 LF or 200 LF of RIBS Bags. Each kit is wrapped in a protective sleeve, so it can be stored until time of use.

Interesting Fact:
One 50’ Section of RIBS Bags = 3,900 sandbags
Alternate Sand Bag System - RIBS Bags & RIBSCage™ - Rapid Installation Barrier System

Heavy-duty woven polypropylene-coated fabric for a water resistant seal.
Alternate Sand Bag System - RIBS Bags & RIBSCage™ - Rapid Installation Barrier System

Portable, easy-to-use system for the filling and installation of temporary berms, stream diversions, isolation dikes, etc.

Benefits & Features

• Lightweight design requires only two (2) people to carry and set up.
• Quick-release wings guide fill and provide easy release when full.
• Each RIBSCage is comprised of only two pieces for easy assembly, removal, and storage.

Slide Containment/Isolation
Alternate Groundwater Management

HydroPlanks use advanced capillary action to redirect stormwater in any direction, without stone or pipe and they do not clog.

- Installed either vertically or horizontally
- Water moves from one plank to the next through the material's capillaries or void space.

2” X 9” X 8’ (10’
3 days after Hurricane Sandy – DRY!
SedJacket Pipe Inlet Protection

A SedJacket is a welded wire cylinder that is partially covered with geotextile. It is slid inside the pipe until it comes to rest against the collar and gasket. It causes sediment to be deposited in the area surrounding the SedJacket.
SedJacket Pipe Inlet Protection

• Is an inlet protection device for pipes

• Is often the “last chance” to trap sediment.

• Creates another tier for higher combined efficiency.

• Can be installed in minutes without equipment.

• Is reusable, there is nothing to haul away.
SedCatch – Sediment Cage – Inlet/Manhole Protection

SEDATCH SEDIMENT CAGE NOTES

1. SEDATCH SEDIMENT CAGE SHOULD BE INSTALLED AT THE TIME THE STRUCTURE IS SET TO KEEP JOB IN COMPLIANCE AND TO PREVENT THE NEED TO CLEAN OUT THE STORM SEWER SYSTEM AT A LATER DATE.

2. FABRIC MUST BE PINCHED UNDER GRATE TO PREVENT SEDIMENT LADEN WATER FROM ENTERING STORM SEWER SYSTEM.

3. REMOVE SEDIMENT ONCE IT ACCUMULATES TO 1/2 THE HEIGHT OF THE SEDIMENT CAGE.

4. TO INCREASE EFFECTIVENESS AND REDUCE MAINTENANCE REQUIREMENTS, THE AREA AROUND THE SEDIMENT CAGE SHOULD BE AS FLAT AS POSSIBLE.
Alternate Soil Binder - Polyacrylamide (PAM)

What Does PAM Do?

- Maintains higher infiltration
- Holds soil in place
USDA Research

► PAM (Anionic) Enviro-Safe
  ▪ EPA & FDA OK’d for food/water etc. uses
  ▪ An animal feed additive
  ▪ No known toxicities in soil/water (even at more than 10x NRCS rates)
  ▪ No PAM accumulation in crops
  ▪ No negative plant effects at these rates

► Anionic PAMs are safe to aquatic life
► Erosion PAMs are ANIONIC
► Do not use CATIONIC PAMS for E&S Controls - They require special handling/use to be safe for aquatic life
USDA Research

untreated water

water with PAM
Flocculation – PAM Demo

Flocculation

What’s your next question?
Filter bags may be used to filter water pumped from disturbed areas prior to discharging to surface waters.

They may also be used to filter water pumped from the sediment storage areas of sediment basins and sediment traps.
Dewatering

- Bags to be located in well-vegetated (grassy) area, and discharged onto stable, erosion resistant areas.

Source: BFA.

Northampton County Conservation District
Dewatering
This is not a good location...
By using a polymer enhanced dispersion field and Floc Logs **AFTER** the sediment bag the fine particulate can be flocculated out and captured allowing only clean water to leave the site.
Sediment Retention Barrier

The Sediment Retention Barrier (SRB) is a double row of silt fence, standing about 3-6 feet apart, filled with loose mulch, straw, woodchips, or other organic matter mixed or blended with the site-specific polymer.

Cross section of a Sediment Retention Barrier:

- Soil-specific Silt Stop powder (50# total per 75 LF of SRB)
- 25 #/Acre Silt Stop powder covered with straw or jute
- 6” straw, woodchips, or organic fill (per layer)

FLOW

8 - 12 ft

3 ft
Apply the correct polymer to the matting.

Apply jute matting to the rock check. The matting provides a surface for attachment of soil-polymer matrix.
The fine sediments become attached to the matting reducing the impacts at the discharge points.
Field Test Plots

Sediment attaches to the straw mat
Case History

Site with specific discharge limits is exceeding permit requirements...

Floc logs, check dams and PAM powder installed upstream of sediment basins...
Case History

Basin discharge limits in compliance!
Case History

Basin discharge limits in compliance!
Alternate Control Estimated Material Costs

**HydroPlanks**
- 8’ Plank - $17.40/ea.
- 10’ Plank - $21.80/ea.

**Polyacrylamide (PAM)**
- Floc Logs (4 logs/Box) - $75 - $125/box
- PAM Power (50lb/bag) - $250 - $375/bag
- PAM Liquid Emulsion (5 Gal. Bucket) - $225-$300/bucket

**Mat & Terra Tubes**
- Jute Matting (4’ x 225’) - $50 -$62/roll
- 9” x 13” Terra Tubes - $2.50 - $4.50/lf
- 8” x 25’ Straw Wattle - $18 - $25/ea.
- 8” X 25’ Straw Wattle (12 per Pallet) - $250-$300/pallet

*Prices will vary by region, quantity purchased, etc.*
Questions?